


FEMCard analysis result

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Project data	
Projectname	crash_transversely_isotropic
Folder	F:\X_tmp_del\Demo_Projects\B_transversely_isotropic\B_crash
Created at	08.06.2015
Maker	Parsolve GmbH
Comment	Synthetic measurement data
Material model	TRANSV_ISOTR SMALL strain transv. isotr. HILL (Rij) VISCOPLASTI. (Cowper-Symonds, nonl. is

Test informations


Test 1

Color	
Number	1
Name	high_velo_Zugv_s_xx_e_xx
Folder	F:\A_synth_meas\B_transversely_isotropic\B_crash\A_meas\C_high_velocity\Zugv_s_xx_e_xx.txt
Load type	Anisotropic time-dependent SMALL strain UNIAXIAL X stress vs. X strain
Weight T	1.96486

Test 2


Color	
Number	2
Name	high_velo_Zugv_s_yy_e_yy
Folder	F:\A_synth_meas\B_transversely_isotropic\B_crash\A_meas\C_high_velocity\Zugv_s_yy_e_yy.txt
Load type	Anisotropic time-dependent SMALL strain UNIAXIAL Y stress vs. Y strain
Weight T	1.96486


Test 3


Color	
Number	3
Name	med_velo_Zugv_s_xx_e_xx
Folder	F:\A_synth_meas\B_transversely_isotropic\B_crash\A_meas\B_med_velocity\Zugv_s_xx_e_xx.txt
Load type	Anisotropic time-dependent SMALL strain UNIAXIAL X stress vs. X strain
Weight T	1.96486


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Test 4	
Color	
Number	4
Name	med_velo_Zugv_s_yy_e_yy
Folder	F:\A_synth_meas\B_transversely_isotropic\B_crash\A_meas\B_med_velocity\Zugv_s_yy_e_yy.txt
Load type	Anisotropic time-dependent SMALL strain UNIAXIAL Y stress vs. Y strain
Weight T	1.96486

Test 5	
Color	
Number	5
Name	slow_velo_Zugv_s_xx_e_xx_e_yy
Folder	F:\A_synth_meas\B_transversely_isotropic\B_crash\A_meas\A_slow_velocity\Zugv_s_xx_e_xx_e_yy.txt
Load type	Anisotropic time-dependent SMALL strain UNIAXIAL X stress vs. X and Y strains
Weight T	1

Test 6	
Color	
Number	6
Name	slow_velo_Zugv_s_yy_e_yy_e_zz
Folder	F:\A_synth_meas\B_transversely_isotropic\B_crash\A_meas\A_slow_velocity\Zugv_s_yy_e_yy_e_zz.txt
Load type	Anisotropic time-dependent SMALL strain UNIAXIAL Y stress vs. Y and Z strains
Weight T	1.02632

Test 7	
Color	
Number	7
Name	slow_velo_Schubv_s_xy_g_xy
Folder	F:\A_synth_meas\B_transversely_isotropic\B_crash\A_meas\A_slow_velocity\Schubv_s_xy_g_xy.txt
Load type	Anisotropic time-dependent SMALL strain SHEAR X_Y stress vs. X_Y engineering shear s
Weight T	1.96486

Tests weight TR

Test 1		
Start	End	Value
0	16	12
17	32	3.99
33	49	2.23

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50	66	1.57
67	82	1.29
83	99	1

Test 2		
Start	End	Value
0	16	12
17	32	3.99
33	49	2.23
50	66	1.57
67	82	1.29
83	99	1

Test 3		
Start	End	Value
0	16	12
17	32	3.99
33	49	2.23
50	66	1.57
67	82	1.29
83	99	1

Test 4		
Start	End	Value
0	16	12
17	32	3.99
33	49	2.23
50	66	1.57
67	82	1.29
83	99	1

Test 5		
Start	End	Value
0	16	12
17	32	3.99
33	49	2.23
50	66	1.57
67	82	1.29
83	99	1

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Test 6		
Start	End	Value
0	16	12
17	32	3.99
33	49	2.23
50	66	1.57
67	82	1.29
83	99	1

Test 7		
Start	End	Value
0	16	12
17	32	3.99
33	49	2.23
50	66	1.57
67	82	1.29
83	99	1

Tests weight SD

Test 5	
Strain direction	Value
ε_{exp}^{xx}	1
ε_{exp}^{yy}	2.31

Test 6	
Strain direction	Value
ε_{exp}^{yy}	1
ε_{exp}^{zz}	1.68

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Model parameter					
Parameter	Fix	Lower limit	Upper limit	Start value	Result
E_x		1000	300000	70000	6663.326
E_y=E_z		1000	300000	50000	4579.534
nu_xy		-0.2	0.6	0.4	0.3385222
nu_yz		-0.1	0.5	0.3	0.1823515
G_xy		800	300000	30000	4550.914
R_xx	x	1	1	1	1
R_yy		0.2	2	1	0.5992161
R_xy		0.2	2	1	0.798709
Y_0		10	200	60	16.2239
Y_inf		20	300	90	90.22194
Omega		50	800	130	189.7856
H		10	10000	1000	579.6297
D_pow		1e-06	10	0.001	1.184619
n_pow		0.1	8	0.8	1.056492

Processing parameter	
Max. number of steps	200
LM start value	1
Max. error sum of squares	0.01

Processing results	
Steps	21
Least squares sum	0.00116222

Correlation matrix												
	E_x	E_y=E_z	nu_xy	nu_yz	G_xy	R_xx	R_yy	R_xy	Y_0	Y_inf	Omega	H
E_x	1	0.925	-0.41	-0.816	0.823	0	0.052	-0.0699	-0.789	0.103	-0.639	-0.301
E_y=E_z	0.925	1	-0.357	-0.895	0.869	0	-0.214	-0.238	-0.812	0.265	-0.711	-0.427
nu_xy	-0.41	-0.357	1	0.368	-0.369	0	-0.355	-0.209	0.339	0.0906	0.303	0.0863
nu_yz	-0.816	-0.895	0.368	1	-0.811	0	0.286	0.214	0.739	-0.245	0.678	0.393
G_xy	0.823	0.869	-0.369	-0.811	1	0	-0.136	-0.492	-0.749	0.298	-0.718	-0.444
R_xx	0	0	0	0	0	1	0	0	0	0	0	0
R_yy	0.052	-0.214	-0.355	0.286	-0.136	0	1	0.611	0.0738	-0.642	0.244	0.532
R_xy	-0.0699	-0.238	-0.209	0.214	-0.492	0	0.611	1	0.188	-0.614	0.33	0.548
Y_0	-0.789	-0.812	0.339	0.739	-0.749	0	0.0738	0.188	1	0.0321	0.303	0.132

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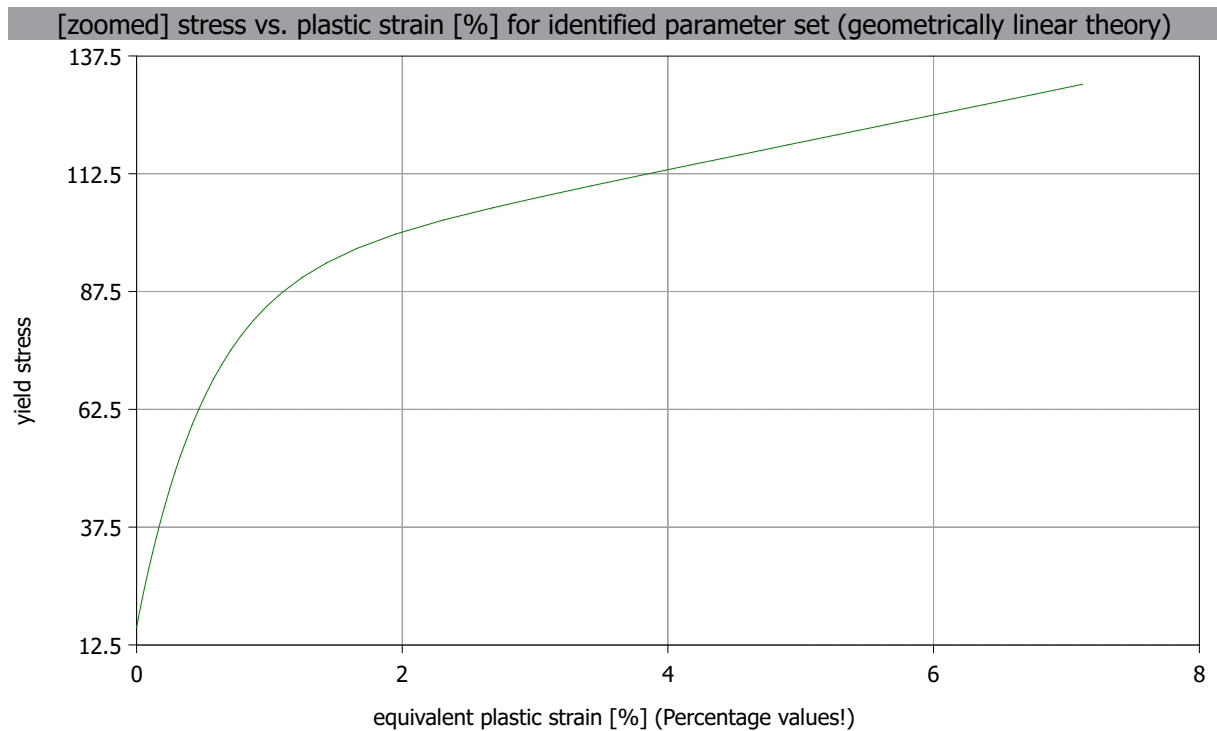
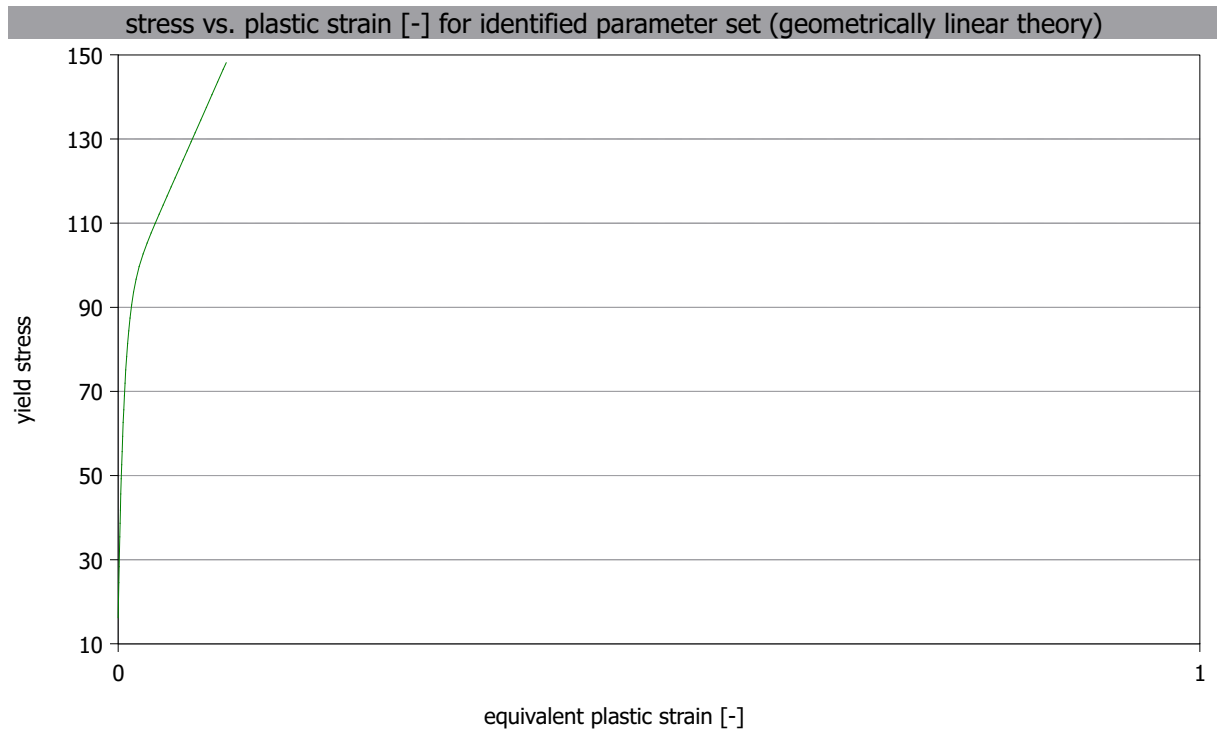
Y_inf	0.103	0.265	0.0906	-0.245	0.298	0	-0.642	-0.614	0.0321	1	-0.69	-0.964	0.145
Omega	-0.639	-0.711	0.303	0.678	-0.718	0	0.244	0.33	0.303	-0.69	1	0.784	
H	-0.301	-0.427	0.0863	0.393	-0.444	0	0.532	0.548	0.132	-0.964	0.784	1	
D_pow	0.921	0.907	-0.326	-0.776	0.756	0	-0.0699	-0.112	-0.72	0.145	-0.6	-0.319	
n_pow	0.806	0.784	-0.426	-0.751	0.7	0	0.0375	0.00555	-0.627	0.0451	-0.577	-0.227	
D_pow	n_pow												
0.921	0.806												
0.907	0.784												
-0.326	-0.426												
-0.776	-0.751												
0.756	0.7												
0	0												
-0.0699	0.0375												
-0.112	0.00555												
-0.72	-0.627												
0.145	0.0451												
-0.6	-0.577												
-0.319	-0.227												
1	0.874												
0.874	1												

stress vs. plastic strain [-] for identified parameter set (geometrically linear theory)	
yield stress	equivalent plastic strain [-]
16.2239	0
20.49323	0.0003
24.53589	0.0006
28.36443	0.0009
31.9907	0.0012
35.42591	0.0015
38.68061	0.0018
41.7648	0.0021
45.62807	0.0025
49.22585	0.0029
52.57758	0.0033
55.70123	0.0037

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59.31034	0.0042
62.61896	0.0047
65.65428	0.0052
68.97061	0.0058
71.96743	0.0064
75.10559	0.0071
78.27836	0.0079
81.39434	0.0088
84.38167	0.0098
87.42365	0.011
90.56595	0.0125
93.60638	0.0143
96.67422	0.0166
99.69672	0.0195
102.6883	0.0231
105.2986	0.0268
107.674	0.0305
109.933	0.0342
112.1343	0.0379
114.307	0.0416
116.4655	0.0453
118.617	0.049
120.7651	0.0527
122.9114	0.0564
125.0569	0.0601
127.2019	0.0638
129.3467	0.0675
131.4915	0.0712
134.5056	0.0764
137.5197	0.0816
140.5338	0.0868
143.5479	0.092
146.5619	0.0972
148.1269	0.0999

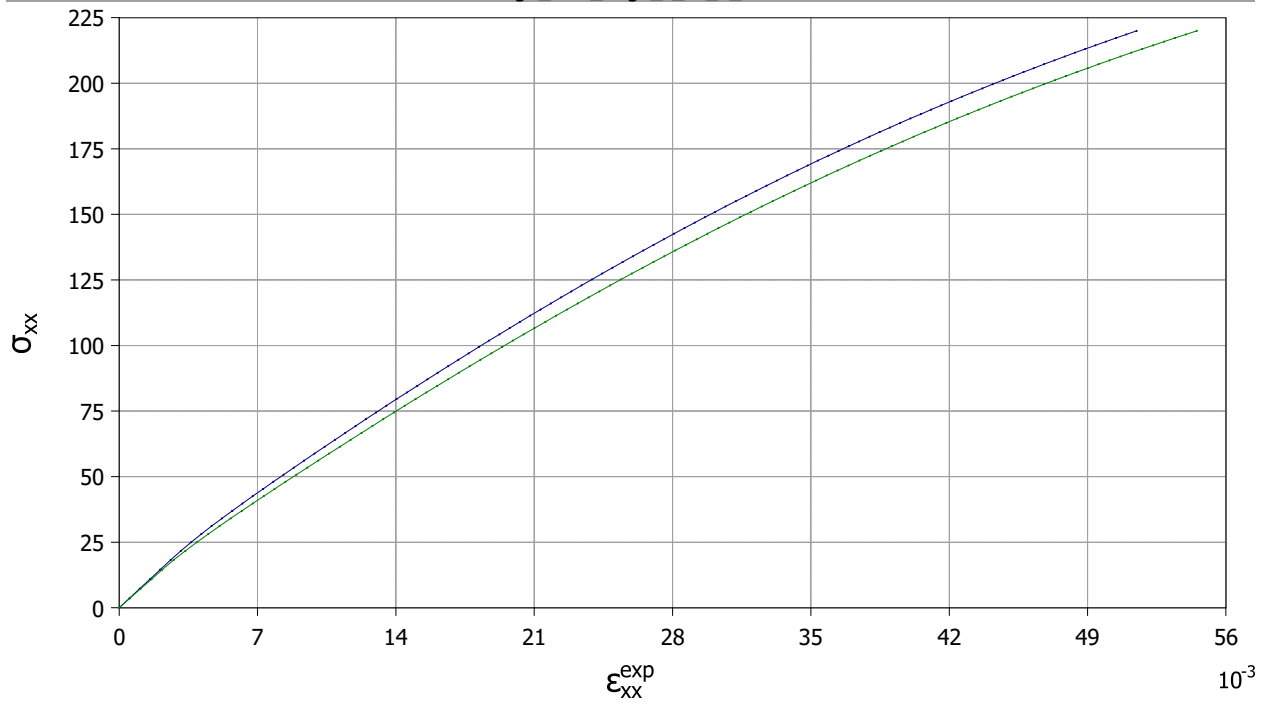


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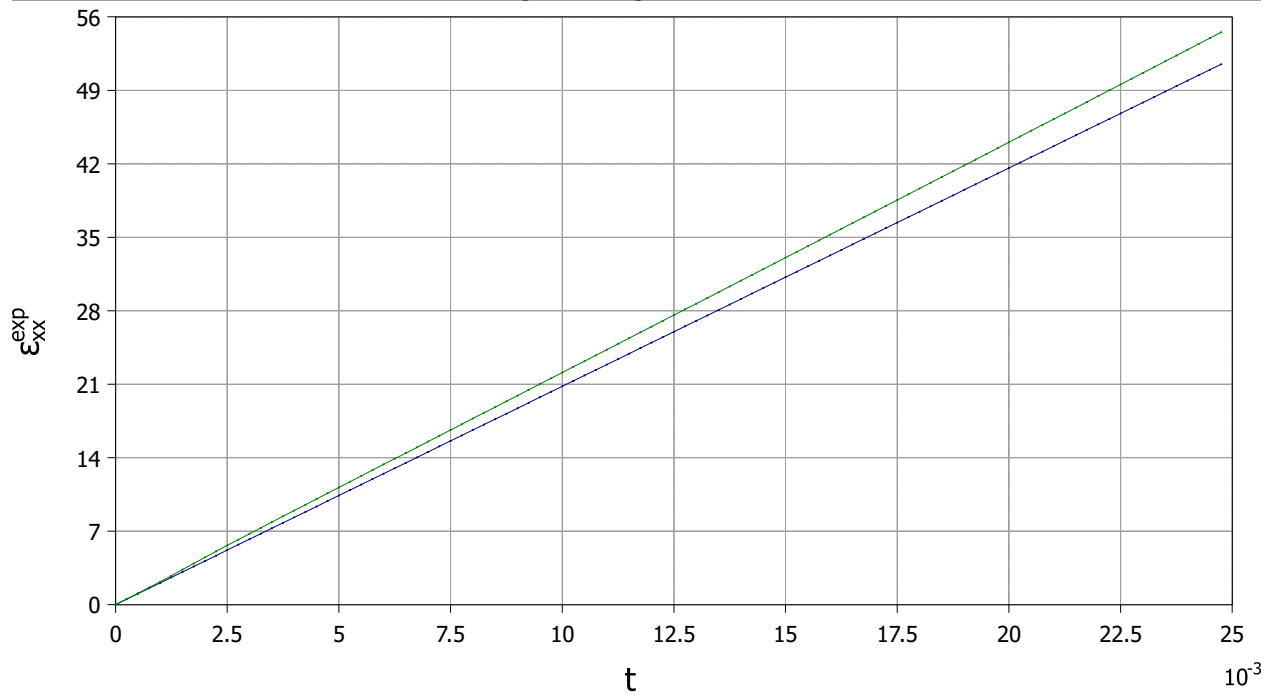
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Verification

high_velo_Zugv_s_xx_e_xx

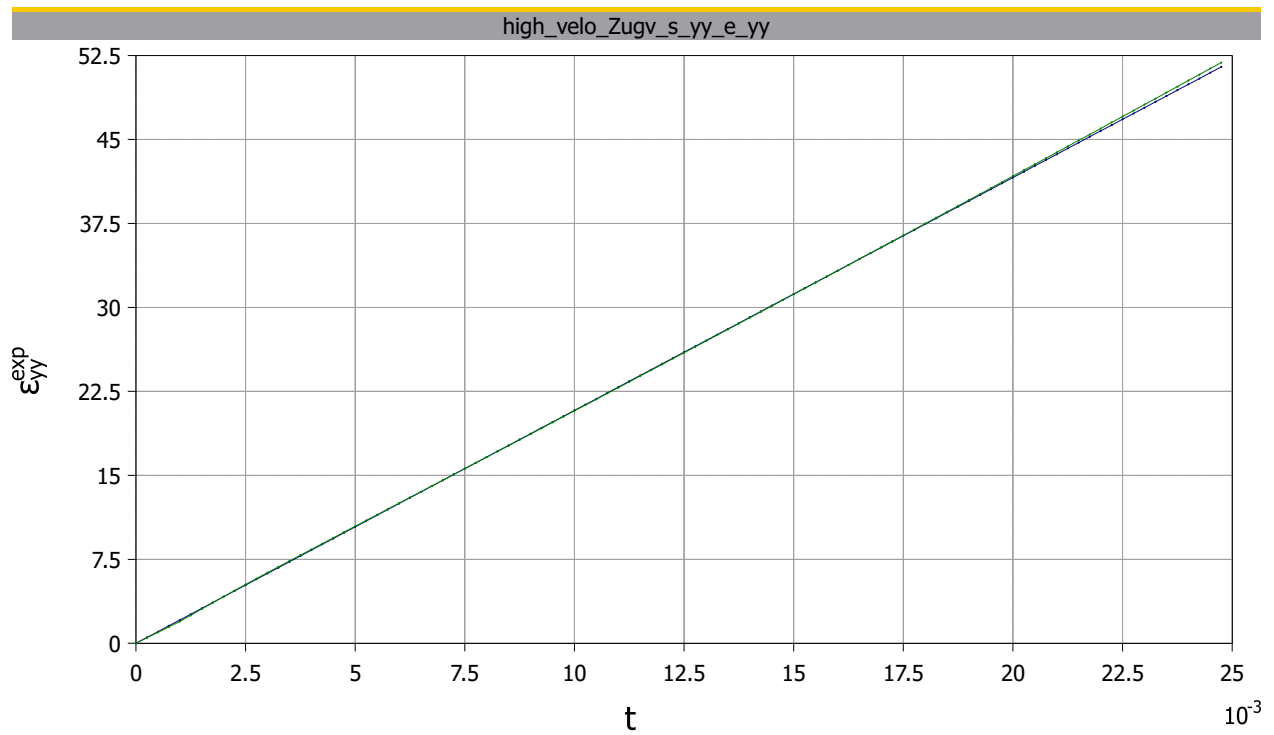
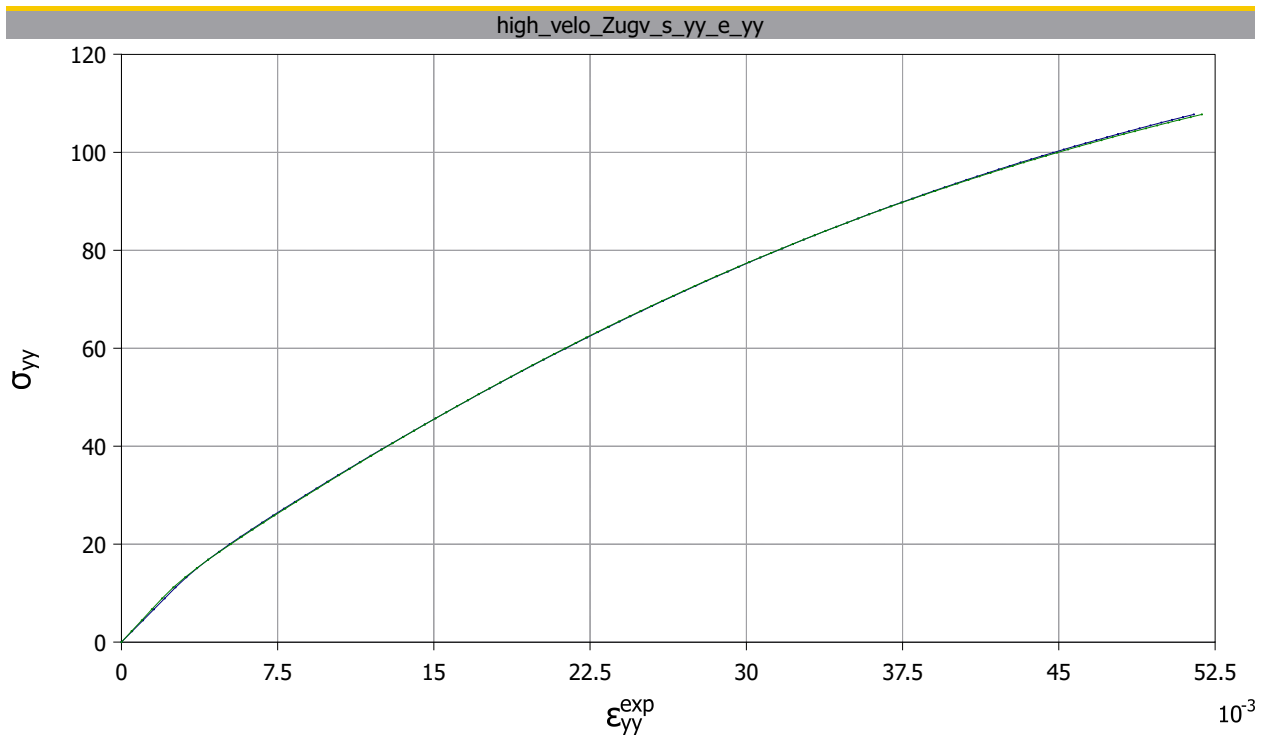


high_velo_Zugv_s_xx_e_xx



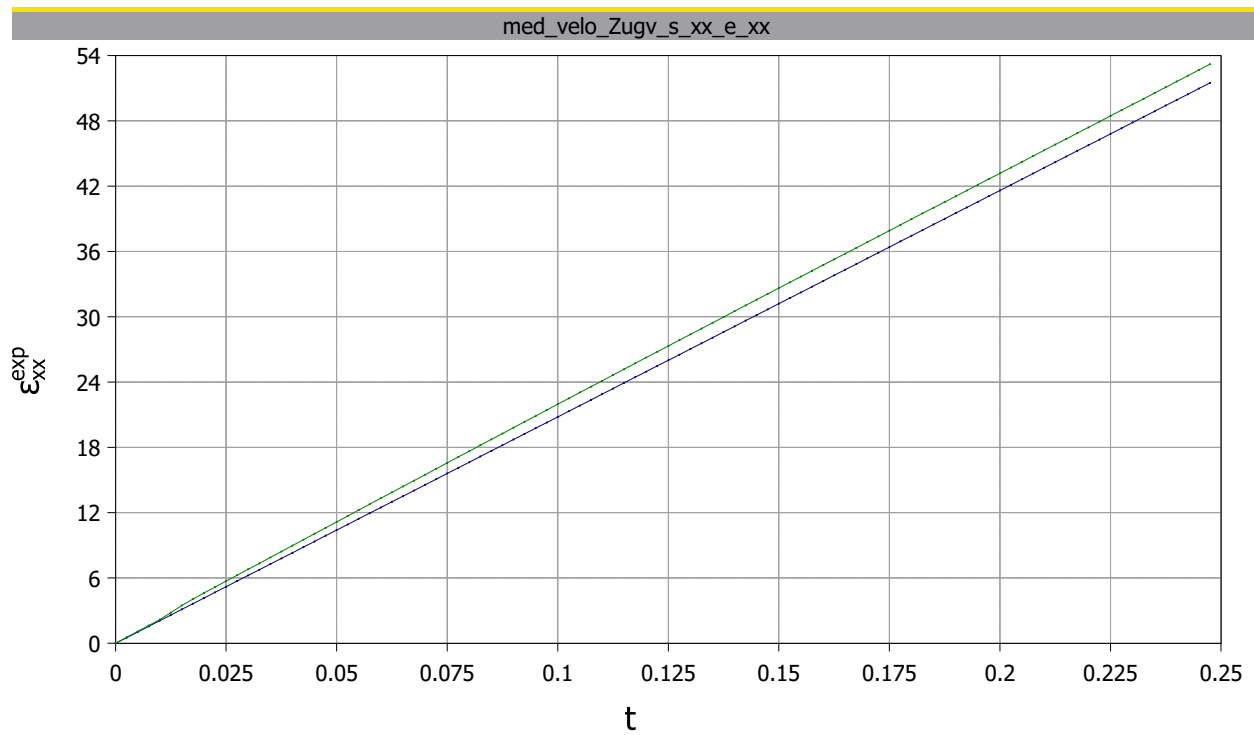
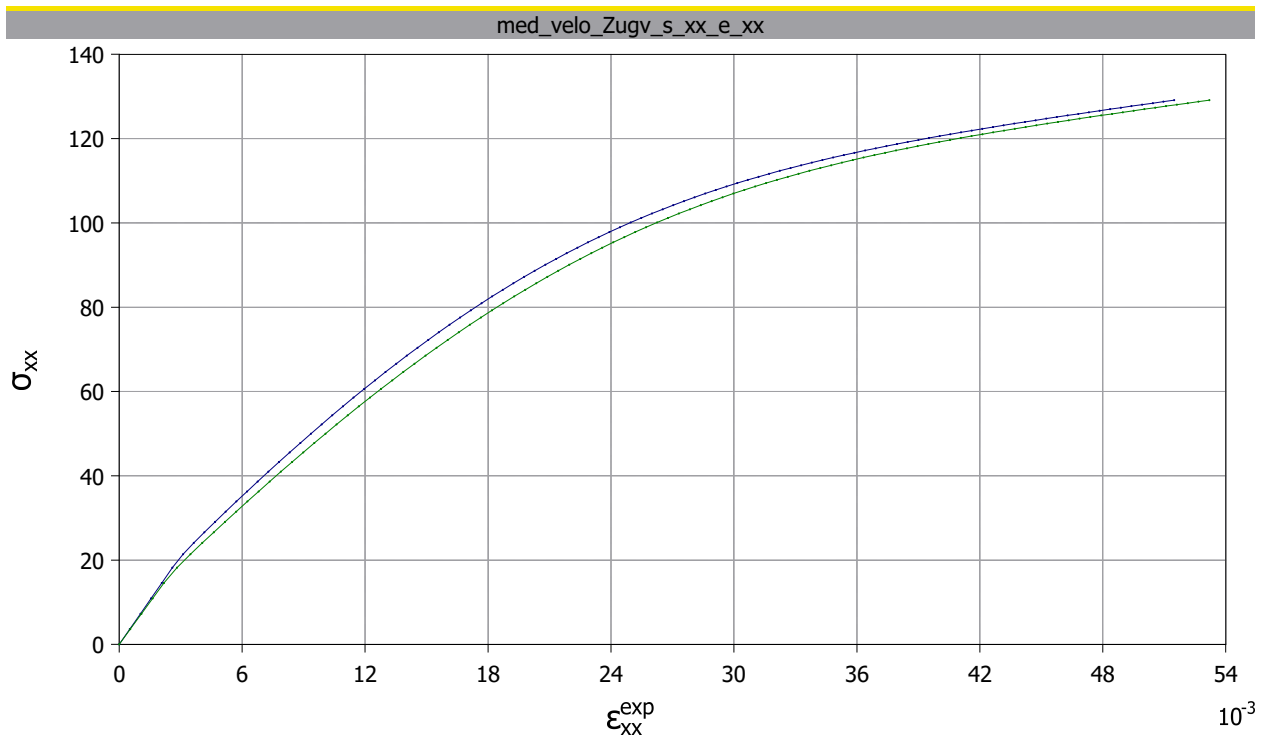
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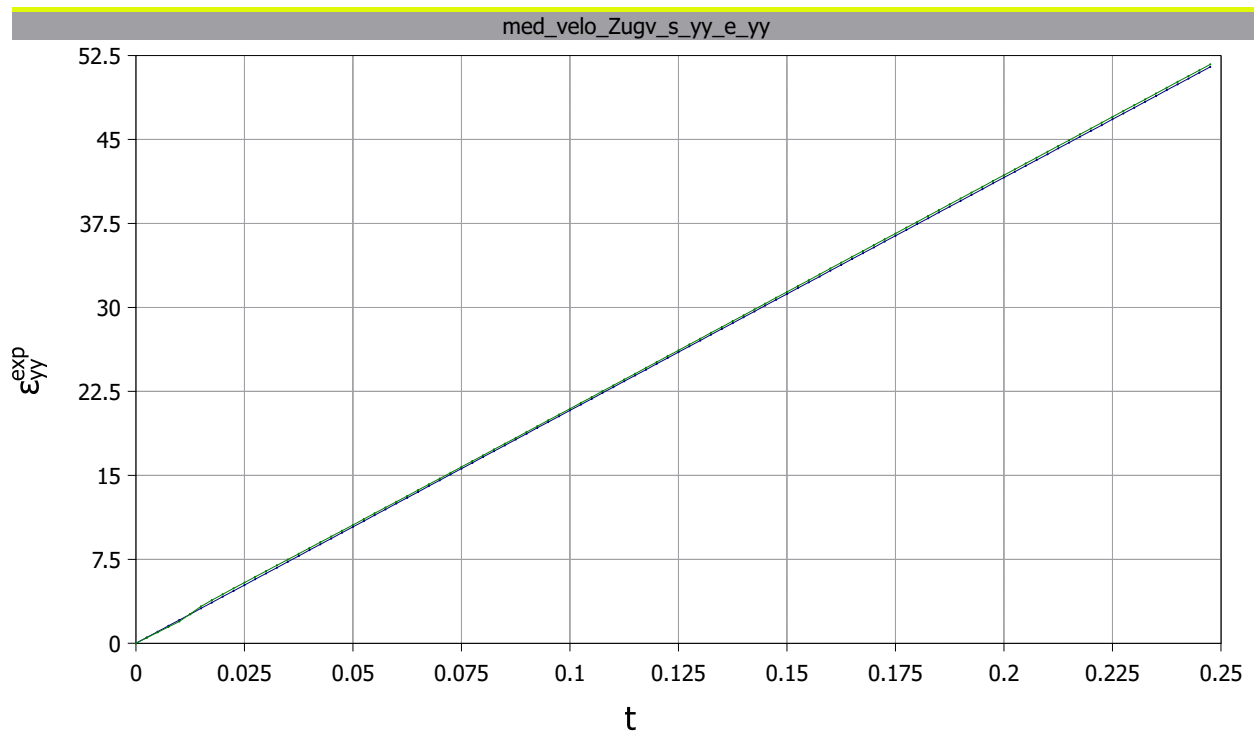
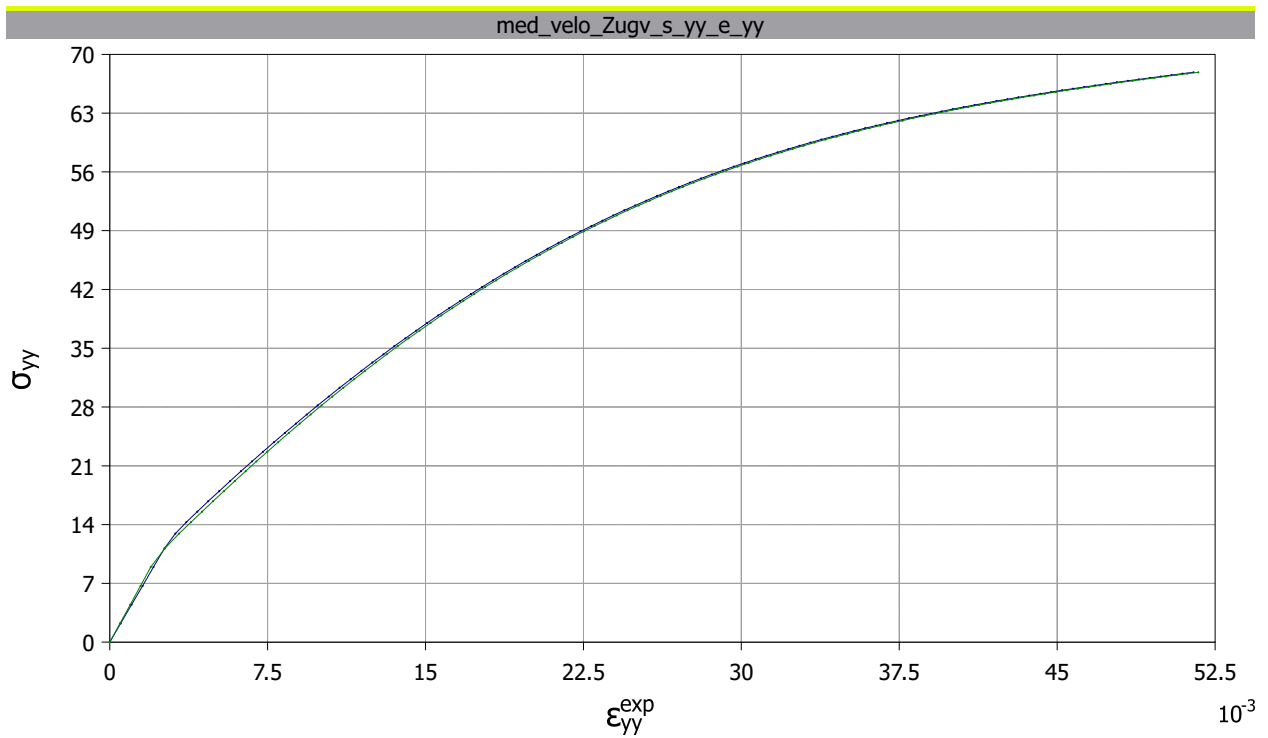
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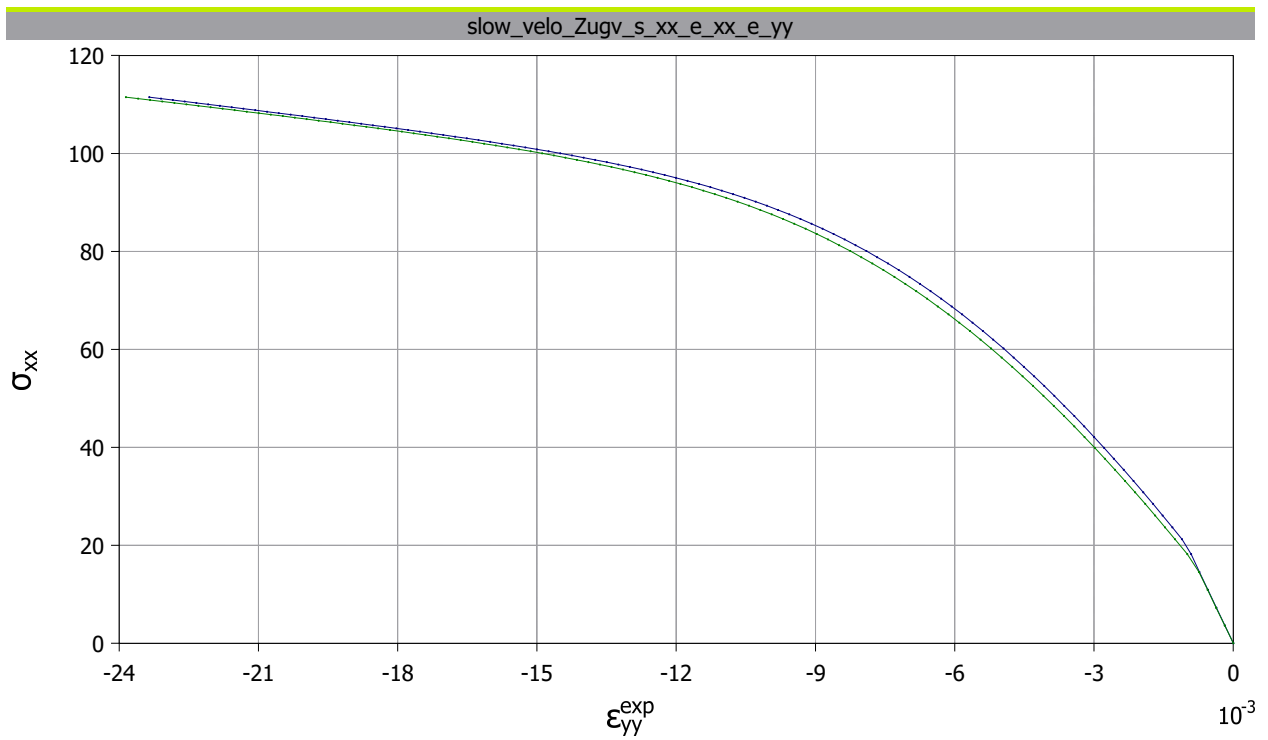
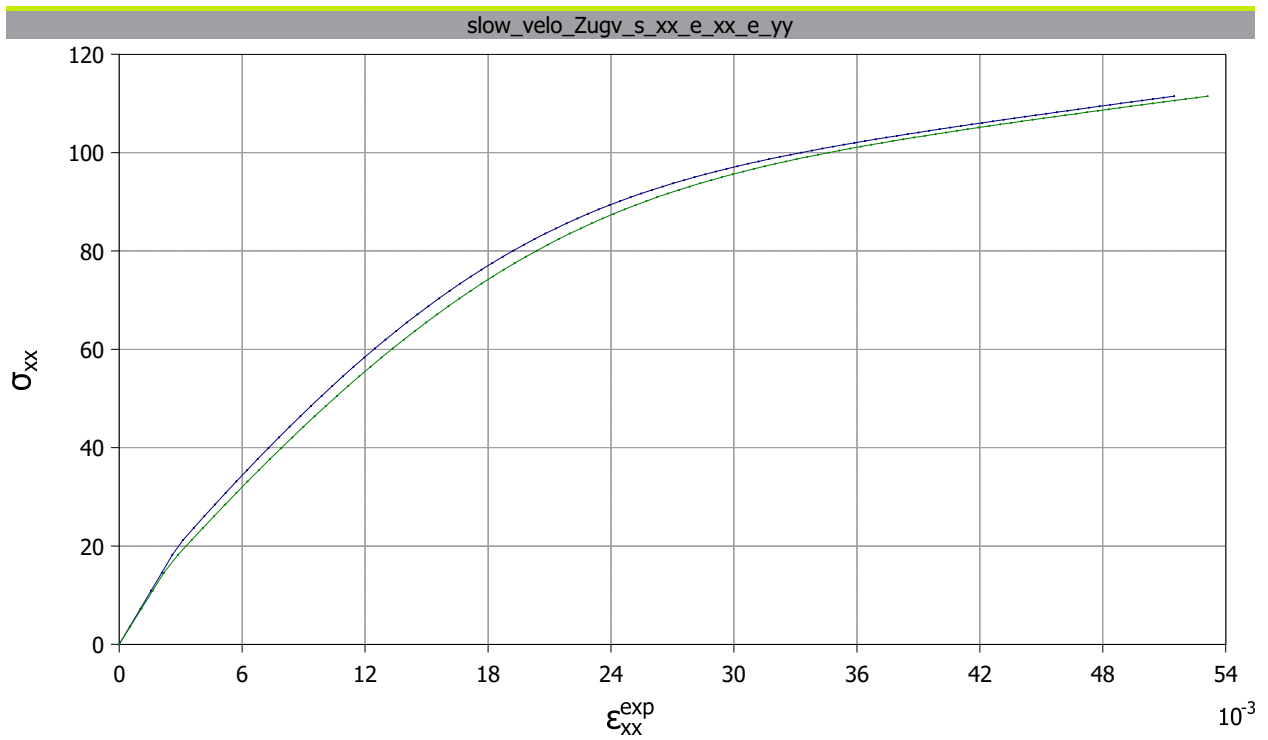
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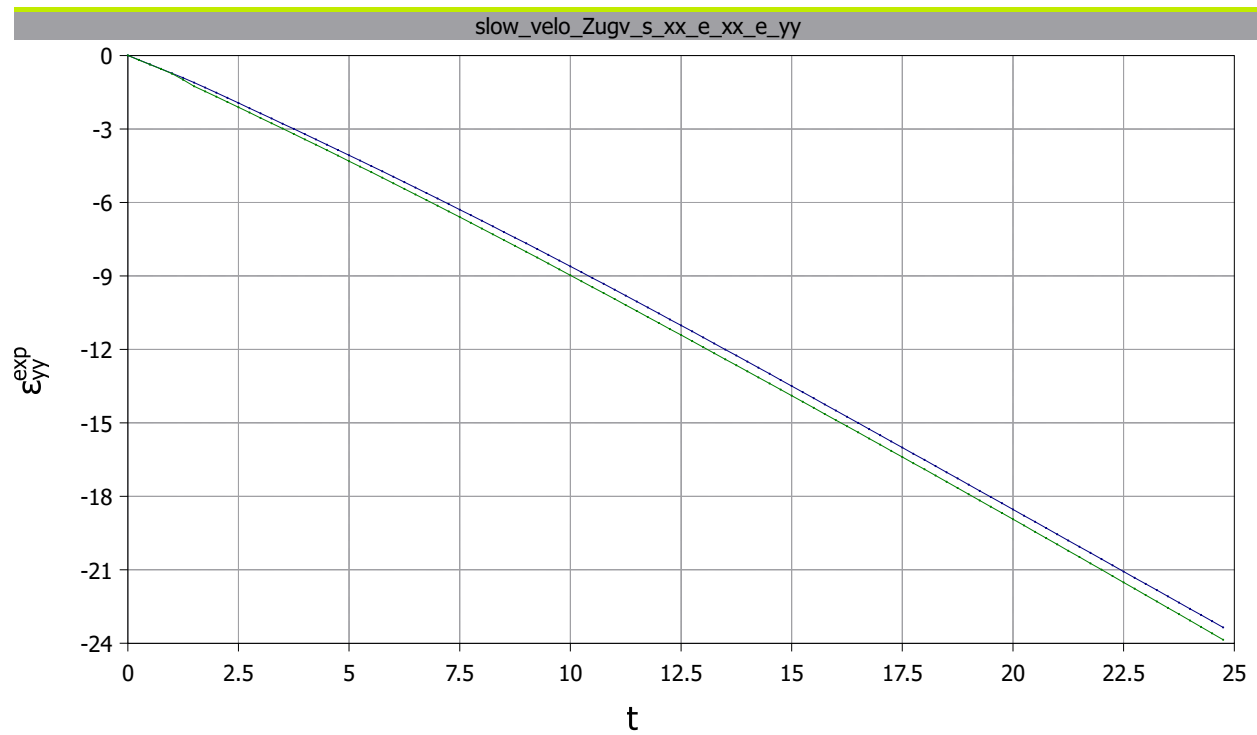
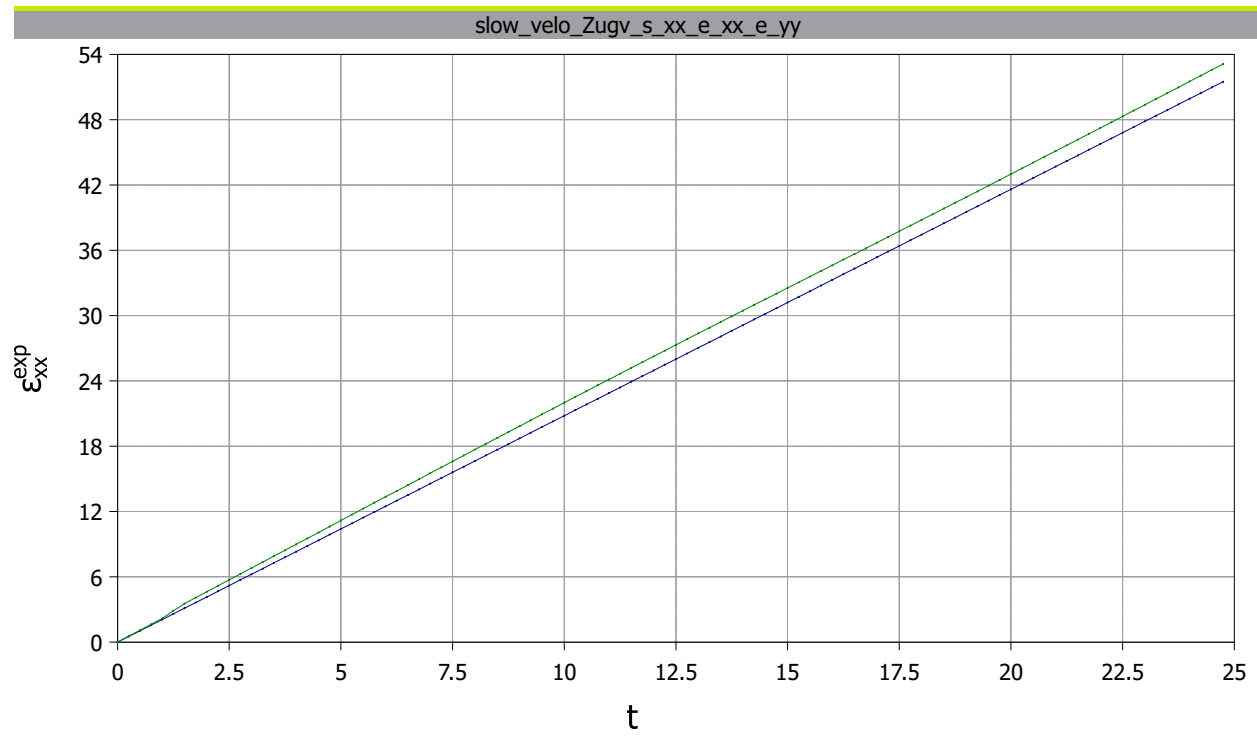
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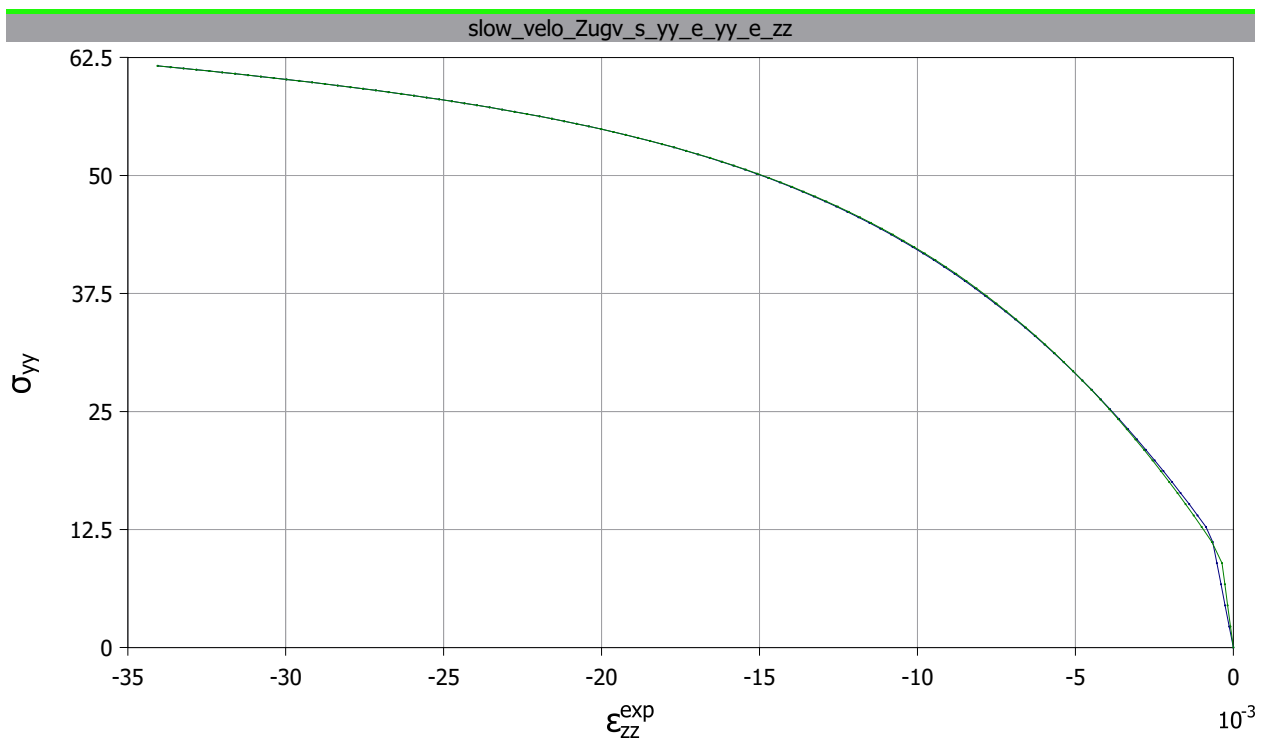
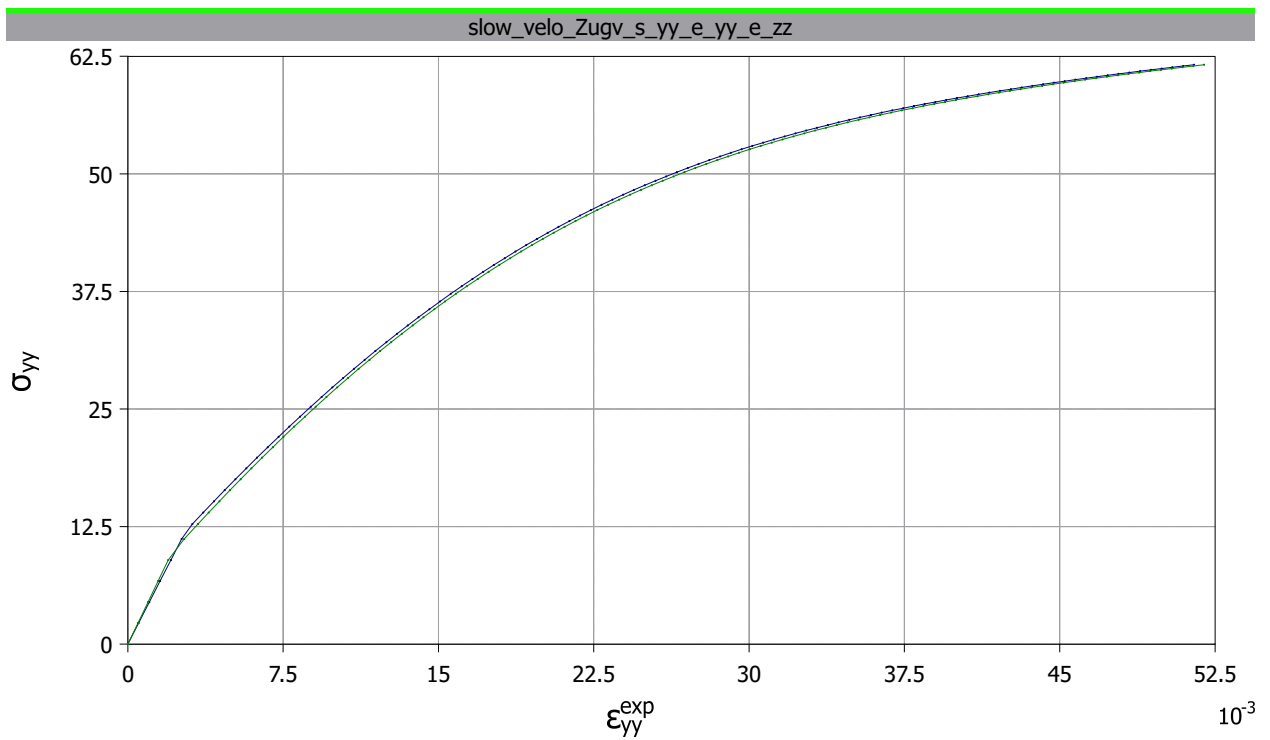
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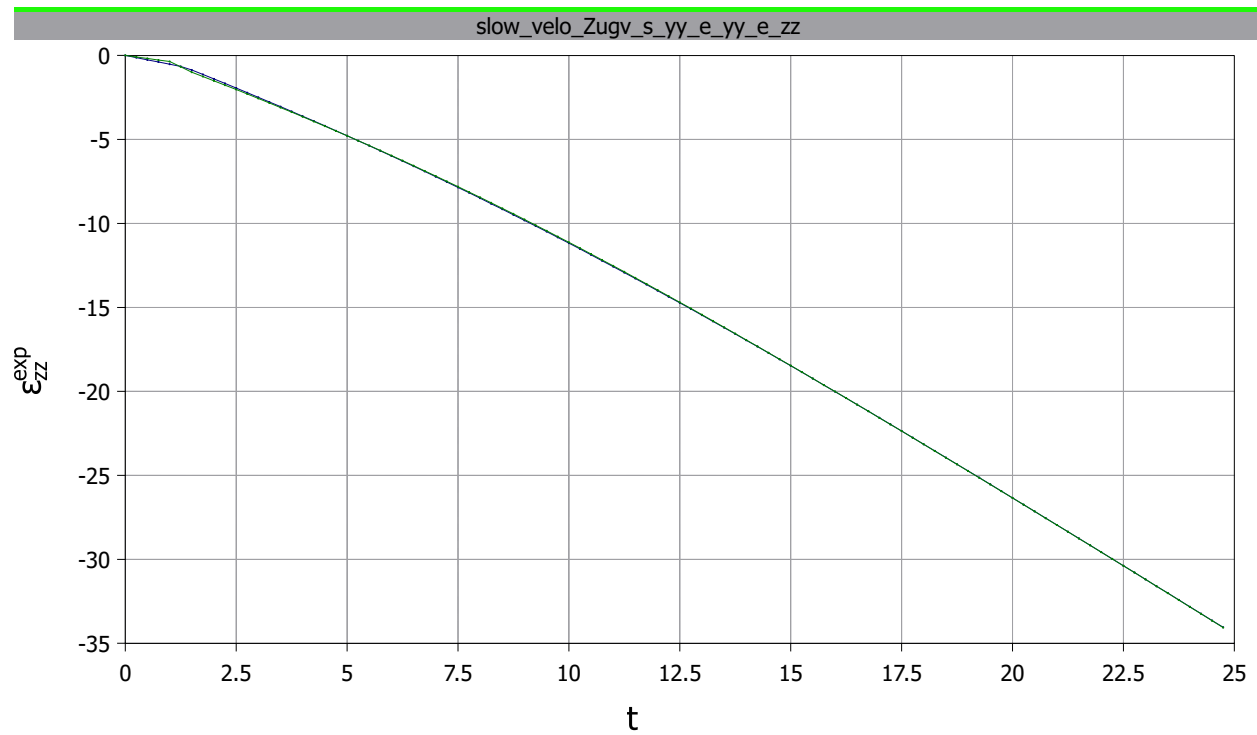
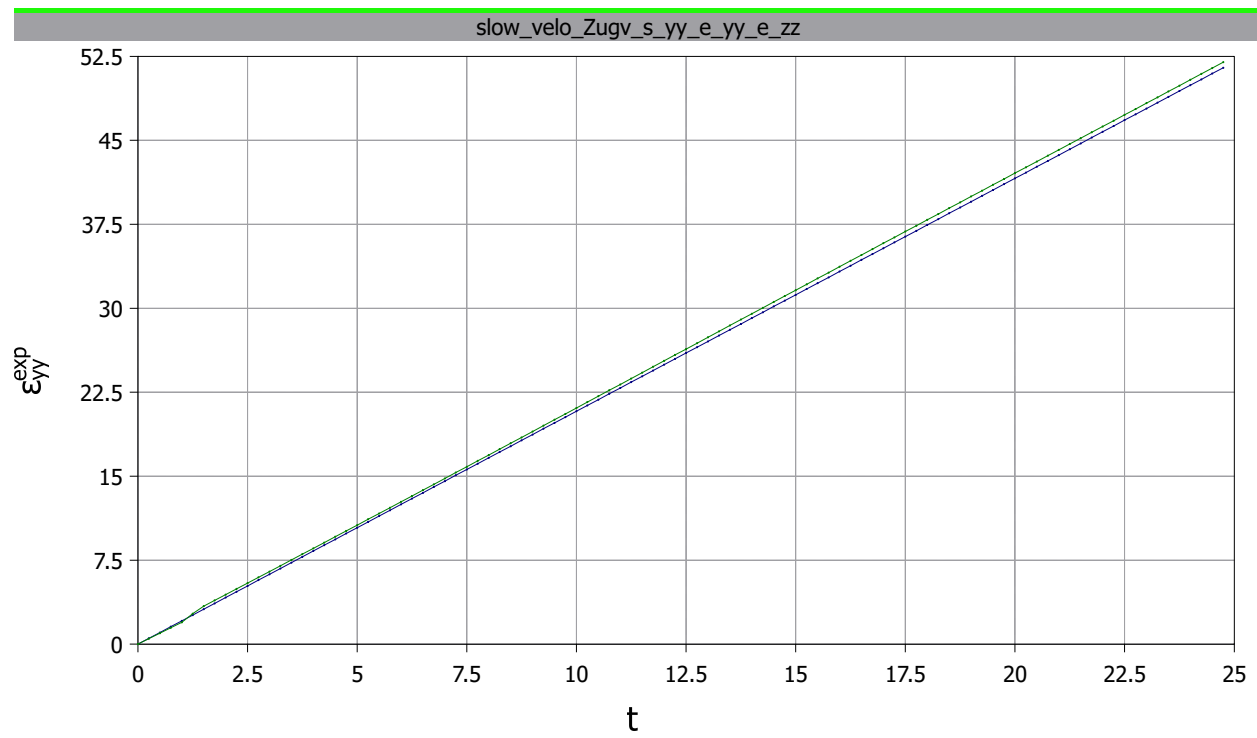
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